

QUIZ NAVIGATION



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Started on	Tuesday, 15 October 2024, 4:02 AM
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Completed on	Tuesday, 15 October 2024, 4:07 AM
Time taken	5 mins 24 secs
Grade	7.00 out of 10.00 (70%)

Question 1

ID: 54328

Correct

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ST is a 63-year-old male that comes into the clinic for a routine check-up. S. tells you that for the past several weeks he has felt really tired. Sometimes even getting up to walk is difficult and he finds himself short of breath. Today ST seems quite pale as he is sitting in your office. About three months ago, ST was treated for peptic ulcer disease and an *H.pylori* infection. At the time of the infection, he did not show any signs or symptoms of a gastrointestinal (GI) bleed. A test of cure showed that his infection was resolved. About a month ago, ST was experiencing some lower back pain for which he was taking ibuprofen. You suspect anemia and recommend iron levels and a complete blood count (CBC).

You receive the following results:

Complete Blood Count

Test	Value	Flag	Units	Reference Range
White blood cell (WBC)	6.9		$10^6/L$	4.8-10.8
Red blood cell (RBC)	1.8	L	$10^{12}/L$	4.7-6.1
Hemoglobin (HB/Hgb)	105	L	g/L	140-180
Hematocrit (HCT)	0.315	L		0.42-0.52
Mean cell volume (MCV)	109.6	H	fL	80-100
Mean cell hemoglobin (MCH)	36.5	H	pg	27-32
Mean cell Hb concentration (MCHC)	333		g/L	320-360
Red cell distribution width (RDW)	16	H	%	11.5-14.5
Platelet count	180		$10^6/L$	150-450
Reticulocyte count	0.002		fL	0.005-0.015
Serum iron	42	H	$\mu\text{mol}/L$	11-32
TIBC	22	L	$\mu\text{mol}/L$	45-82
Serum ferritin	660	H	pmol/L	22-561

ST has not previously had any other health conditions.

Based on the results above, what type of anemia would you suspect S.T. has?

Select one:

- ☐ Anemia of liver dysfunction or thyroid disease ✖
- ☐ Iron deficiency anemia ✖
- ☐ Megaloblastic anemia ✖
- ☒ Unable to diagnose at this time ✔

Rose Wang (ID:113212) this answer is correct. The results are consistent with more than one type of anemia, therefore, more information is required to make a diagnosis.

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Anemia**LEARNING OBJECTIVE:**

To interpret relevant laboratory tests and other diagnostic assessments.

BACKGROUND:

Anemia is a disease state that describes different blood conditions which decrease the oxygen-carrying capacity and results from decreased levels of hemoglobin or red blood cells. Symptoms of anemia may include dizziness, edema, fatigue, shortness of breath, tachycardia, chest pain, low skin temperature, weakness, pallor, pale mucous membranes, and severe congestive heart failure. The World Health Organization (WHO) defines anemia with hemoglobin levels < 120 g/L in non-pregnant females and < 130 g/L in males. There may be many different causes of anemia such as nutrient deficiencies (e.g. iron, vitamin B12, folate), hereditary causes, acute blood loss, and chronic diseases. Lab tests are important to differentiate between the different types of anemia.

A complete blood count may be done which normally includes the total number or percentage of white blood cells, red blood cells, hemoglobin, hematocrit, mean corpuscular volume (MCV), mean corpuscular

hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red blood cell distribution width (RDW), and platelets. An increase or decrease in certain values may help to rule out certain types of anemias and can help identify the cause of anemia.

Iron-deficiency anemia (IDA) is characterized by low levels of hemoglobin, ferritin, transferrin saturation and MCV, normal levels of C-reactive protein and high levels of transferrin. The two main iron-storage proteins that aid the diagnosis of IDA are ferritin and transferrin. Ferritin can be easily influenced by the presence of inflammation, infection, pregnancy or obesity and must not be interpreted alone. Low ferritin level <30 mcg/L usually indicated IDA however in the context of chronic inflammation, the threshold changes to <50mcg/L. Transferrin, on the other hand, is elevated when iron stores are low. Transferrin saturation percentage, which is the ratio of serum iron to total-iron binding capacity, provides information regarding iron metabolism and as such, a reduced level (<20%) indicates iron deficiency while an elevated level (>50%) indicates iron overload. Values consistent with anemia of chronic disease include high levels of C-reactive protein, low hemoglobin, normal-to-high levels of ferritin and low-to-normal levels of transferrin saturation, transferrin, and MCV. The combination of iron deficiency anemia and chronic disease is consistent with high levels of C-reactive protein, normal-to-high levels of ferritin, low-to-normal levels of transferrin saturation, and low levels of hemoglobin, transferrin, and MCV. Megaloblastic anemia is a subset of macrocytic anemia and includes both pernicious anemia (vitamin B12 deficiency) and folate deficiency anemia which requires further testing in order to determine the specific type of anemia.

RATIONALE:

Correct Answer:

- **Unable to diagnose at this time** - The results are consistent with more than one type of anemia, therefore, more information is required to make a diagnosis.

Incorrect Answer:

- **Anemia of liver dysfunction or thyroid disease** - The blood test results might be consistent with this type of anemia; however, it is not the only possibility based on the available information.
- **Iron deficiency anemia** - The test results are inconsistent with this condition as both serum iron and serum ferritin is high when they should be low.
- **Megaloblastic anemia** - The blood test results are consistent with megaloblastic anemia; however, it is not the only possibility based on the available information.

TAKEAWAY/KEY POINTS:

Different types of anemias can be differentiated through lab tests such as complete blood counts, however, vitamin B12 and folate tests are required in order to diagnose macrocytic anemia.

REFERENCE:

- [1] Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. World Health Organization. <http://www.who.int/vmnis/indicators/haemoglobin.pdf>.
- [2] Anemia - National Library of Medicine - PubMed Health. <https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0062933/>.
- [3] Laboratory Tests Interpretation. <https://www.nurseslearning.com/courses/nrp/labtest/course/section3/c1.htm>.
- [4] Anemia - Clinical Methods - NCBI Bookshelf. <https://www.ncbi.nlm.nih.gov/books/NBK254/>.
- [5] Lim W. Common Anemias. In: Compendium of Therapeutic Choices. Ottawa, ON: Canadian Pharmacists Association. <https://myrxtx.ca>.

The correct answer is: Unable to diagnose at this time

Question 2

ID: 54330

Correct

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Send Feedback

BM a 34-year-old female, presents to her family physician complaining of fatigue and thinning hair. BM takes a multivitamin daily, citalopram 20 mg for anxiety and uses salbutamol 100 mcg when needed for exertion during exercise. She inquires about the possibility of being iron deficient and whether blood work is warranted. Her family doctor agrees to do a complete blood count.

Which of the following investigations would **NOT** contribute to confirming a specific type of anemia diagnosis?

Select one:

- ☐ Vitamin B12 ✗
- ☐ Folate ✗
- ☐ Iron ✗
- ☒ Hemoglobin ✓

Rose Wang (ID:113212) this answer is correct. Hemoglobin is tested during a complete blood count or hemoglobin test which can be used to see if a patient has anemia. However, it cannot be used to differentiate between different types of anemia.

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Anemia

LEARNING OBJECTIVE:

To interpret relevant laboratory tests and other diagnostic assessments.

BACKGROUND:

Anemia is a condition that describes different blood conditions that decrease the oxygen-carrying capacity and results from decreased levels of hemoglobin or red blood cells. Symptoms of anemia may include dizziness, edema, fatigue, shortness of breath, tachycardia, weakness, pallor, pale mucous membranes, and severe congestive heart failure. The World Health Organization (WHO) defines anemia with hemoglobin levels < 120 g/L in females and < 130 g/L in males. There may be many different causes of anemia such as nutrient deficiencies (e.g. iron, vitamin B12, folate), hereditary causes, acute blood loss, and chronic diseases. In order to differentiate between the different types of anemia, lab tests are important. A complete blood count may be done which normally includes the total number or percentage of white blood cells, red blood cells, hemoglobin, hematocrit, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), Red blood cell distribution width (RDW), and platelets. An increase or decrease in certain values including C-reactive protein, ferritin, transferrin, transferrin saturation, MCV, iron, folate and vitamin B12 may help to identify the cause of anemia.

In the case of macrocytic anemias, vitamin B12 and folate deficiencies are common causes. When a patient with vitamin B12 deficiency has a diet that is high in folate, the folate supplementation may mask the effects of vitamin B12 deficiency. This makes it important that further testing is required in order to make a proper diagnosis.

Iron-deficiency anemia (IDA) is characterized by low levels of hemoglobin, ferritin, transferrin saturation and MCV, normal levels of C-reactive protein and high levels of transferrin. The two main iron-storage proteins that aid the diagnosis of IDA are ferritin and transferrin. Ferritin can be easily influenced by the presence of inflammation, infection, pregnancy or obesity and must not be interpreted alone. Low ferritin level <30 mcg/L usually indicated IDA however in the context of chronic inflammation, the threshold changes to <50 mcg/L. Transferrin, on the other hand, is elevated when iron stores are low. Transferrin saturation percentage, which is the ratio of serum iron to total-iron binding capacity, provides information regarding iron metabolism and as such, a reduced level (<20%) indicates iron deficiency while an elevated level (>50%) indicates iron overload. Values consistent with anemia of chronic disease include high levels of C-reactive protein, low hemoglobin, normal-to-high levels of ferritin and low-to-normal levels of transferrin saturation, transferrin, and MCV. The combination of iron deficiency anemia and chronic disease is consistent with high levels of C-reactive protein, normal-to-high levels of ferritin, low-to-normal levels of transferrin saturation, and low levels of hemoglobin, transferrin, and MCV. Megaloblastic anemia is a subset of macrocytic anemia and includes both pernicious anemia (vitamin B12 deficiency) and folate deficiency anemia which requires further testing in order to determine the specific type of anemia.

RATIONALE:

Correct Answer:

- **Hemoglobin** - Hemoglobin is tested during a complete blood count or hemoglobin test which can be used to see if a patient has anemia. However, it cannot be used to differentiate between different types of anemia.

Incorrect Answers:

- **Vitamin B12** - Vitamin B12 testing would be required to confirm when macrocytic anemia is suspected in order to determine the specific type of anemia.
- **Folate** - Folate testing would be required to confirm when macrocytic anemia is suspected in order to determine the specific type of anemia.
- **Iron** - Iron concentrations would be required to confirm iron deficiency anemia if microcytic anemia is suspected.

TAKEAWAY/KEY POINTS:

Hemoglobin is usually tested when a complete blood count is taken. This test alone cannot differentiate between different types of anemia.

REFERENCE:

- [1] Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. World Health Organization. <http://www.who.int/vmnis/indicators/haemoglobin.pdf>.
- [2] Anemia - National Library of Medicine - PubMed Health. <https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0062933/>.
- [3] Laboratory Tests Interpretation. <https://www.nurseslearning.com/courses/nrp/labtest/course/section3/c1.htm>.
- [4] Anemia - Clinical Methods - NCBI Bookshelf. <https://www.ncbi.nlm.nih.gov/books/NBK254/>.
- [5] Lim W. Common Anemias. In: Compendium of Therapeutic Choices. Ottawa, ON: Canadian Pharmacists Association. <https://myrxtx.ca>.

The correct answer is: Hemoglobin

Question 3

ID: 54320

Correct

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YZ is a 79-year-old male who has been admitted to hospital following a fall at home. He is awaiting news of a hip replacement. In preparation for the operation, YZ's care team would like to optimize his health. His chart notes the following: BP 135/82 mm Hg, HR 72 bpm, afebrile, concern of macrocytic anemia. Home medications: telmisartan 80 mg daily, atorvastatin 20 mg in the evening, fluoxetine 20 mg daily, and tamsulosin CR 0.4 mg daily.

Based on the information, which of the following anemia(s) could YZ be suffering from?

Select one:

- ☐ Pernicious anemia ✗
- ☐ Spherocytic anemia ✗
- ☒ Pernicious anemia and folate deficiency anemia ✓

Rose Wang (ID:113212) this answer is correct. Pernicious anemia and folate deficiency anemia are classified as macrocytic anemia.

- ☐ Folate deficiency anemia and spherocytic anemia ✗

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Anemia

LEARNING OBJECTIVE:

To identify the subsets of macrocytic anemia.

BACKGROUND:

Mean corpuscular volume (MCV) is a measure of the average volume of red blood cells. When MCV levels are greater than 100 fL, it is known as macrocytosis. Pernicious (vitamin B12 deficiency) anemia and folate deficiency anemia are both types of macrocytic anemias. Pernicious anemia is generally caused by malabsorption of vitamin B12, medications (e.g. metformin, proton pump inhibitors), suboptimal diet, or certain medical conditions (e.g. Crohn's disease, pancreatic insufficiency). Folate deficiency anemia is generally caused by dietary deficiency or alcoholism. In order to determine the difference between the two, vitamin B12 and folate levels must be measured.

RATIONALE:

Correct Answer:

- **Pernicious anemia and folate deficiency anemia** - Pernicious anemia and folate deficiency anemia are classified as macrocytic anemia.

Incorrect Answers:

- **Pernicious anemia** - Pernicious anemia is classified as macrocytic anemia, however, it is not the only type of anemia classified as macrocytic anemia.
- **Spherocytic anemia** - Spherocytic anemia is not classified as macrocytic anemia.
- **Folate deficiency anemia and spherocytic anemia** - Folate deficiency anemia is classified as macrocytic anemia, however, spherocytic anemia is not.

TAKEAWAY/KEY POINTS:

Pernicious anemia and folate deficiency anemia are types of macrocytic anemias.

REFERENCE:

[1] Evaluation of Macrocytosis - American Family Physician. <http://www.aafp.org/afp/2009/0201/p203.html>.
The correct answer is: Pernicious anemia and folate deficiency anemia

Question 4

ID: 54326

Incorrect

Flag question

Send Feedback

GB is a 58-year-old patient who recently had annual blood work completed. GB, who identifies by pronouns they/them, suffers from atopic dermatitis for which they use betamethasone 0.05% ointment. They are not complaining of any new onset symptoms or other medical conditions. When the physician reviews the lab results, he notes an elevated hematocrit.

Which of the following conditions is characterized by an increased hematocrit?

Select one:

- ☐ Pernicious anemia ✗
- ☐ Iron deficiency anemia ✗
- ☒ Sickle cell anemia ✗
- ☐ Dehydration ✓

Rose Wang (ID:113212) this answer is incorrect. Sickle cell anemia has a decreased hematocrit.

Incorrect

Marks for this submission: 0.00/1.00.

TOPIC: Anemia

LEARNING OBJECTIVE:

To identify possible causes of increased hematocrit.

BACKGROUND:

Hematocrit (Hct) is a measure of how much of an individual's blood is made up of red blood cells and is

dependent on the number and size of red blood cells. Blood samples are needed in order to measure Hct. When reading Hct values, normal values are 40.7-50.3% in males and 36.1-44.3% in females.

An increased Hct value can also have many different causes such as:

- Decreased body water
- Low levels of oxygen in the blood
- Congenital heart disease
- Heart failure
- Bone marrow disease
- Scarring or thickening of the lungs

A decreased Hct value may have many different causes such as:

- Anemia
- Malnutrition
- Increased body water
- Iron/folate/vitamin B12/vitamin B6 deficiency
- Bleeding
- Destruction of red blood cells
- Leukemia

RATIONALE:

Correct Answer:

- **Dehydration** - Dehydration is characterized by an increased hematocrit as blood volume is decreased.

Incorrect Answers:

- **Pernicious anemia** - Pernicious anemia has a decreased hematocrit.
- **Iron deficiency anemia** - Iron deficiency anemia has a decreased hematocrit.
- **Sickle cell anemia** - Sickle cell anemia has a decreased hematocrit.

TAKEAWAY/KEY POINTS:

An increased hematocrit value may be due to a decrease in total body water. Iron deficiency or blood loss may account for decreased hematocrit.

REFERENCE:

[1] Hematocrit: MedlinePlus Medical Encyclopedia.
<https://www.nlm.nih.gov/medlineplus/ency/article/003646.htm>.

The correct answer is: Dehydration

Question 5

ID: 54332

Correct

Flag question

Send Feedback

KP is a 58-year-old male who suffers from type 2 diabetes mellitus and hypertension, for which he is well managed on his current medications: metformin 1000 mg BID, empagliflozin 10 mg daily, amlodipine 10 mg daily and rosuvastatin 5 mg daily at bedtime. His most recent hemoglobin A1C level (2 weeks ago) was 6.9%. During this recent annual checkup with his family physician, it was noted that his blood work demonstrated high red blood cell distribution width (RDW).

What does a high RDW signify for KP?

Select one:

- ☐ Decreased hemoglobin ✗
- ☐ Increased production of new red blood cells (RBC) ✗
- ☒ Red blood cell size variation ✓
- ☐ Decreased RBC size ✗

Rose Wang (ID:113212) this answer is correct. Red blood cell distribution width (RDW) is close to zero when all the cells are the same size, but increases with greater variability in the size of cells.

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Anemia

LEARNING OBJECTIVE:

To identify the significance of red blood cell distribution width (RDW).

BACKGROUND:

RDW is a measure of variation in red blood cell size or volume. When there is a variation in red blood cell size, the value of RDW increases. The variability of the RDW parameter is also known as anisocytosis. A high RDW is a sign of anemia or a related condition. Macrocytosis is a term for red blood cells (RBCs) that are larger in size than normal. This may be caused by abnormalities of RBC production in the bone marrow, altered RBC membrane composition, or an increase in the percentage of reticulocytes.

RATIONALE:**Correct Answer:**

- **Red blood cell size variation** - Red blood cell distribution width (RDW) is close to zero when all the cells are the same size, but increases with greater variability in the size of cells.

Incorrect Answers:

- **Decreased hemoglobin** - Hemoglobin is measured by a specific hemoglobin test.
- **Increased production of new red blood cells (RBC)** - Increased production of RBC is measured by a reticulocyte count.
- **Decreased RBC size** - Change in RBC size is a measure of mean corpuscular volume (MCV).

TAKEAWAY/KEY POINTS:

A high RDW value indicates that the red blood cells in the body vary in size.

REFERENCE:

[1] Red Cell Distribution Width (RDW): REFERENCE Range, Interpretation, Collection and Panels. Available at: <http://emedicine.medscape.com/article/2098635-overview>.

The correct answer is: Red blood cell size variation

Question 6

ID: 54334

Correct

Flag question

Send Feedback

TH is a 45-year-old female who has pernicious anemia and suffers from vasomotor symptoms related to her early-onset menopause. She uses hormonal replacement therapy to manage these symptoms including hot flashes. TH reports living an active lifestyle and is currently training to run a half marathon. Her anemia has been interfering with her ability to run long distances, so her doctor agreed to treat her with vitamin B12.

What test provides the earliest indication that the treatment is working?

Select one:

☒ Reticulocyte count

Rose Wang (ID:113212) this answer is correct. Reticulocyte count increases when the bone marrow starts to produce more red blood cells as a result of vitamin B12 therapy. This means the deficiency has been addressed.

☐ Red cell distribution width (RDW) test ✗

☐ Total iron-binding capacity (TIBC) test ✗

☐ Mean corpuscular volume (MCV) test ✗

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Anemia

LEARNING OBJECTIVE:

To identify the lab tests that confirm vitamin B12 therapy has an effect on red blood cells.

BACKGROUND:

A reticulocyte count is used to estimate the degree of the production of red blood cells, otherwise known as erythropoiesis. A reticulocyte count can be measured as an absolute reticulocyte count or as a percentage. A decrease in reticulocyte indicates that there is decreased red blood cell production. This may be a cause of vitamin B12, folic acid or iron deficiency, it may also be a result of decreased erythropoietin level, aplastic anemia, bone marrow replacement, or post-radiation therapy. An increase in reticulocyte count may result from post-hemolysis, post-bleeding, or response to therapy (e.g. vitamin B12, folic acid or iron supplementation). In the case of pernicious anemia, patients are deficient in vitamin B12. When the patient has been treated with vitamin B12 supplementation, the earliest indication that the supplementation is working is an increase in reticulocyte count.

RATIONALE:**Correct Answer:**

- **Reticulocyte count** - Reticulocyte count increases when the bone marrow starts to produce more red blood cells as a result of vitamin B12 therapy. This means the deficiency has been addressed.

Incorrect Answers:

- **Red cell distribution width (RDW) test** - RDW initially increases after B12 administration and then decreases. It is not the most sensitive nor earliest indicator that treatment is working.
- **Total iron-binding capacity (TIBC) test** - TIBC test cannot be used to test for B12 deficiency or B12 treatment efficacy.
- **Mean corpuscular volume (MCV) test** - MCV initially increases after B12 administration and then decreases. It is not the most sensitive nor earliest indicator that treatment is working.

TAKEAWAY/KEY POINTS:

The reticulocyte count test provides the earliest indication that treatment for pernicious anemia is working.

REFERENCE:

[1] Reticulocyte Count and Reticulocyte Hemoglobin Content: REFERENCE Range, Interpretation, Collection and Panels. <http://emedicine.medscape.com/article/2086146-overview>.

The correct answer is: Reticulocyte count

Question 7

ID: 54370

Incorrect

Flag question

Send Feedback

KG is a 26-year-old pregnant female in her second trimester. Her obstetrician suspects that she may be suffering from anemia and has the nurse obtain a blood sample. When the results come back, the physician asks you, the pharmacist, to interpret the results and make a recommendation accordingly. You are unsure based on the lab values which subtype of anemia KG is suffering from.

Which of the following may be used to differentiate anemia of chronic diseases from iron deficiency anemia?

Select one:

- ☐ Hematocrit ✖
- ☐ Mean corpuscular volume ✖
- ☒ Ferritin ✔
- ☐ Transferrin saturation ✖

Rose Wang (ID:113212) this answer is incorrect. Transferrin saturation may be low in both iron deficiency anemia and anemia of chronic disease.

Incorrect

Marks for this submission: 0.00/1.00.

TOPIC: Anemias

LEARNING OBJECTIVE:

To identify tests that may differentiate between two differing anemias.

BACKGROUND:

Microcytosis is defined as red blood cells that are a smaller size than the normal range (< 80 fL). There are many causes of microcytosis/microcytic anemia; however, the most common cause is iron deficiency. To differentiate between iron deficiency and other microcytic states, iron stores in the body are the most definitive test. When iron is deficient, the total iron binding capacity (TIBC) increases as there is no iron to bind. The body also binds all free serum iron using transferrin as a defense mechanism to deprive the invading organism of iron. Therefore, when iron deficient, the TIBC and transferrin levels will increase. Iron deficiency anemia will also have decreased ferritin levels.

Parameter	Iron Deficiency Anemia	Anemia of Chronic Disease
C-Reactive protein	Normal	High
Hemoglobin	Low	Low
Ferritin	Low	Normal-high
Transferrin saturation	Low	Low-normal
Transferrin	High	Low-normal
Mean corpuscular volume	Low	Low-normal
Hematocrit	Low	Low

RATIONALE:

Correct Answer:

- **Ferritin** - Ferritin is low in iron deficiency anemia and normal or high in anemia of chronic disease.

Incorrect Answers:

- **Hematocrit** - Hematocrit is low in both iron deficiency and chronic disease anemias.
- **Mean corpuscular volume** - Mean corpuscular volume is low in iron deficiency and may be low or normal in chronic disease anemias.
- **Transferrin saturation** - Transferrin saturation may be low in both iron deficiency anemia and anemia of chronic disease.

TAKEAWAY/KEY POINTS:

Ferritin tests may be a differentiating factor between iron deficiency anemia and anemia of chronic disease.

REFERENCE:

[1] Microcytic anemia. Differential diagnosis and management of iron deficiency anemia. - PubMed - NCBI. <https://www.ncbi.nlm.nih.gov/pubmed/1578956>.

[2] Schrier SL. Microcytosis/Microcytic anemia. Tirnauer JS, ed. UpToDate. Waltham, MA: UpToDate Inc. <http://www.uptodate.com>.

The correct answer is: Ferritin

Question 8

ID: 54365

Incorrect

Flag question

Send Feedback

Which of the following blood disorders can be differentiated by looking at red blood cell distribution width (RDW) test results?

Select one:

☐ Thalassemia trait anemia and anemia of chronic disease ✗

Rose Wang (ID:113212) this answer is incorrect. Thalassemia trait anemia and anemia of chronic disease are microcytic anemias with a low RDW so they cannot be differentiated using RDW test results.

☒ Thalassemia trait anemia and iron deficiency anemia ✓

☐ Pernicious anemia and folate deficiency anemia ✗

☐ Hemolytic anemia and iron deficiency anemia ✗

Incorrect

Marks for this submission: 0.00/1.00.

TOPIC: Anemia

LEARNING OBJECTIVE:

To identify medical conditions that may be identified through red blood cell distribution width.

BACKGROUND:

Microcytosis is defined as red blood cells that are a smaller size than the normal range (<80 fL). There are many causes of microcytosis/microcytic anemia, however, the most common cause is iron deficiency. In order to differentiate between iron deficiency and other microcytic states, iron stores in the body are the most definitive test. When iron deficient, the total iron binding capacity (TIBC) increases as there is no iron to bind. The body also binds all of the free serum iron using transferrin as a defense mechanism to deprive the invading organism of iron. Another common cause of microcytosis is thalassemia. Thalassemia is defined as an inherited condition that is characterized by reduced levels of hemoglobin due to lack of globin chains. Compared to iron deficiency anemia, the red blood cell count in thalassemia can be normal or increased. The iron stores in thalassemia can also be normal and increased. Another way to distinguish between thalassemia and iron deficiency anemia is through red blood cell distribution width (RDW). In general, thalassemia has a normal value of RDW as the red blood cells are usually of the same size. However, for iron deficiency anemia, the red blood cells vary in size resulting in an increase in RDW value.

RATIONALE:

Correct Answer:

- **Thalassemia trait anemia and iron deficiency anemia** - Thalassemia trait disorder has decreased RDW. Compared to iron deficiency anemia, the RDW is high meaning that there is a large variation in the size of red blood cells.

Incorrect Answers:

- **Thalassemia trait anemia and anemia of chronic disease** - Thalassemia trait anemia and anemia of chronic disease are microcytic anemias with a low RDW so they cannot be differentiated using RDW test results.
- **Pernicious anemia and folate deficiency anemia** - Pernicious anemia and folate deficiency anemia are macrocytic anemias with an elevated RDW so they cannot be differentiated based on this test.
- **Hemolytic anemia and iron deficiency anemia** - Hemolytic anemia is normocytic and iron deficiency anemia is microcytic but the RDW in both are elevated so they cannot be distinguished based on RDW.

TAKEAWAY/KEY POINTS:

One way to differentiate thalassemia from iron deficiency anemia can be through RDW. Iron deficiency anemia usually results in red blood cells of variable sizes which means a greater RDW value and in thalassemia, the red blood cells are usually the same size which means a normal RDW value.

REFERENCE:

[1] Red Cell Distribution Width (RDW): Reference Range, Interpretation, Collection, and Panels. <http://emedicine.medscape.com/article/2098635-overview>.

[2] Microcytic anemia. Differential diagnosis and management of iron deficiency anemia. - PubMed - NCBI.

<https://www.ncbi.nlm.nih.gov/pubmed/1578956>.

[3] Schrier SL. Microcytosis/Microcytic anemia. Tirnauer JS, ed. UpToDate. Waltham, MA: UpToDate Inc. <http://www.uptodate.com>.

The correct answer is: Thalassemia trait anemia and iron deficiency anemia

Question 9

ID: 54363

Correct

Flag question

Send Feedback

CB is a 34 year-old female complaining of fatigue and brittle nails. She suffers from menorrhagia for which she has been taking a combined oral contraceptive once daily on a 28-day cycle and uses NSAIDs during menstruation for cramping. She takes no other prescription nor over-the-counter medications. Her only known drug allergy is to sulfa drugs for which she reports a rash. CB's physician orders blood work to investigate her symptoms and finds that her patient has been suffering from iron-deficiency anemia.

Which of the following is **NOT** a goal of therapy for CB?

- ☐ Alleviate fatigue and other symptoms ✗
- ☐ Minimize side effects from treatment ✗
- ☒ Delay menstruation to once every 3 cycles ✓
- ☐ Restore hemoglobin levels > 120 g/L ✗

Rose Wang (ID:113212) this answer is correct.
Delaying menstruation to once every 3 cycles is not a goal of therapy for CB.

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Anemia

LEARNING OBJECTIVE:

To identify the goals of therapy for anemia.

BACKGROUND:

Anemia is a condition that describes different blood conditions that decrease the oxygen-carrying capacity and results from decreased levels of hemoglobin or red blood cells. Symptoms of anemia may include dizziness, edema, fatigue, shortness of breath, tachycardia, chest pain, low skin temperature, weakness, pallor, pale mucous membranes, and severe congestive heart failure. The World Health Organization (WHO) defines anemia with hemoglobin levels < 120 g/L in non-pregnant females and < 130 g/L in males. There may be different causes of anemia such as nutrient deficiencies (e.g. iron, vitamin B12, folate), hereditary causes, acute blood loss, and chronic diseases. Lab tests are important to differentiate between the different types of anemia.

Goals of therapy for anemia include alleviating the signs and symptoms of anemia, investigating and treating underlying cause(s), restoring normal or adequate hemoglobin levels, and minimizing side effects associated with drug therapy.

RATIONALE:

Correct Answer:

- **Delay menstruation to once every 3 cycles** - Delaying menstruation to once every 3 cycles is not a goal of therapy for CB.

Incorrect Answers:

- **Alleviate fatigue and other symptoms** - Alleviating signs and symptoms of anemia is a goal of therapy for CB.
- **Minimize side effects from treatment** - Minimizing side effects from treatment is a goal of therapy for CB.
- **Restore hemoglobin levels > 120 g/L** - Restoring normal hemoglobin levels (> 120 g/L) is a goal of therapy for CB.

TAKEAWAY/KEY POINTS:

Goals of therapy for anemia include alleviating signs and symptoms, investigating and treating underlying cause(s), restoring normal or adequate hemoglobin levels, and minimizing side effects associated with drug therapy.

REFERENCE:

[1] Lim W. Common Anemias. In: Compendium of Therapeutic Choices. Ottawa, ON: Canadian Pharmacists Association. <https://myrxtx.ca>.

The correct answer is:
Delay menstruation to once every 3 cycles

Question 10

ID: 54359

Correct

You are working at your local community pharmacy. Patient RJ is filling his new prescription for ferrous fumarate 300 mg which his family physician prescribed for iron-deficiency anemia. RJ has never suffered from anemia before and the only other medications that he takes is acetaminophen 500 mg for occasional headaches and dextroamphetamine 100 mg once daily x1 month for ADHD.

500 mg for occasional headaches and doxycycline 100 mg once daily x 1 month for acne.

Which of the following counselling points would **NOT** be appropriate to mention to RJ when he picks up his prescription?

- ☒ This iron salt preparation is the most effective ✓
Rose Wang (ID:113212) this answer is correct. There is no evidence that one preparation is better than another.
- ☐ This medication may result in gastrointestinal upset including nausea, dyspepsia or constipation ✗
- ☐ Take this medication 3 hours before or 2 hours after doxycycline ✗
- ☐ Avoid taking this medication with food ✗

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Anemia

LEARNING OBJECTIVE:

To understand the properties of available oral iron formulations.

BACKGROUND:

First-line treatment for iron deficiency anemia is oral iron. Adults require 120 mg/day of elemental iron while children require 3 mg/kg/day (for up to 60 mg). Generally, treatment with oral iron is continued for 3 months after target hemoglobin levels are achieved. Oral iron is best taken on an empty stomach for maximal absorption, however, it can be taken with orange juice as the vitamin C will increase absorption (not strong quality evidence). Dairy products should be avoided during the time of administration (3 hours before and 2 hours after). Parenteral iron is second-line treatment.

RATIONALE:

Correct Answer:

- **This iron salt preparation is the most effective** - There is no evidence that one preparation is better than another.

Incorrect Answers:

- **This medication may result in gastrointestinal upset including nausea, dyspepsia or constipation** - Common side effects of iron include gastrointestinal upset such as nausea, dyspepsia, and constipation.
- **Take this medication 3 hours before or 2 hours after doxycycline** - Absorption of iron is decreased by certain medications such as tetracyclines.
- **Avoid taking this medication with food** - Absorption of iron is decreased by food.

TAKEAWAY/KEY POINTS:

There is no evidence that one salt preparation of oral iron is better absorbed than another.

The correct answer is:

This iron salt preparation is the most effective

Finish review